

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the application of: Solar Cell Module	)	Atty Dkt. TOR.011.0001.NP
	)	
Inventor: Sadaji Tsuge	)	Confirmation No.: 1063
	)	
Serial No.: 09/788,339	)	Examiner: Barton, Jeffrey Thomas
	)	
Filing or 371(c) Date: 2/21/2001	)	Art Unit: 1753

Honorable Commissioner for Patents  
Alexandria, Virginia 22313-1450

BRIEF ON APPEAL

This is an appeal from the final rejection of claims 16, 18-20 and 22-24 in the Office action dated January 15, 2008. A Notice of Appeal was filed on April 15, 2008. A one-month extension of time is requested from June 15, 2008 to July 15, 2008 for filing this brief.

REAL PARTY IN INTEREST

The real party in interest in this application is Sanyo Electric Co., Ltd. of Osaka, Japan.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences, which would have any direct or indirect effect on the Board's decision in the present appeal.

STATUS OF THE CLAIMS

Claims 16, 18-20 and 22-24 are pending in this application and stand finally rejected. Claims 1-15, 17, 21, and 25-27 have been cancelled. Claim 16 is the sole independent claim on appeal. This appeal is directed to claims 16, 18-20 and 22-24.

### STATUS OF AMENDMENTS

The Advisory action dated April 30, 2008 indicated that the amendment after final filed April 15, 2008 would be entered upon appeal.

### SUMMARY OF THE CLAIMED SUBJECT MATTER

The claimed invention provides a solar cell module with increased light efficiency and high power generation without degradation. With reference to Fig. 1, the invention provides a solar cell element (3); an incident light transmitting member (1) made of a glass adhered at a light incidence side of the solar cell element by a resin (4); and a rear surface member (2) comprising a transparent resin film adhered at a rear surface side of the solar cell element by a resin (4). The solar cell element (3) comprises a semiconductor junction (31-32) so as to form an electric field and is sealed with each of the resin adhering the light incidence side light transmitting member and the rear surface member. The resin for adhering the incident light transmitting member at the light incidence side of the solar cell element contains a sodium ion depositing from the incident light transmitting member (paragraph 0027 published application), and the solar cell element comprises a one conductive type crystalline semiconductor substrate (31) between the semiconductor junction and the resin containing the sodium ion so as to shield a diffusion of sodium ion to the semiconductor junction; and an anti-reflection layer (37) between the one conductive type semiconductor substrate and the resin containing the sodium ion, said anti-reflection layer comprising a silicon dioxide layer. The structure of the claimed invention is described at paragraphs 0027, 0033-0040 of the specification as published.

In accordance with the claimed invention, a transparent rear surface member (2) is used to increase the amount of light entering the solar cell for production of electric power. In the prior art, such transparent member resulted in increased permeation of water into the module, with resulting degradation of power generation. The present inventors discovered that this undesired degradation is related to diffusion of sodium ions from the front glass surface into the resin when water enters into the module, and subsequent degradation of the semiconductor junction caused by the increased sodium ion concentration. Accordingly, the present invention solves this discovered problem by

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forming the semiconductor junction (31-32) at a location away from or opposite to the incident light transmitting or glass surface.

As shown in Figs. 1 and 2, the p-n junction (between layers 31 and 32, Fig. 1, and between layers 51 and 53, Fig. 2) is formed opposite from the glass surface 1 as opposed to the prior art solar cell module as shown in Fig. 4.

#### GROUND OF REJECTION TO BE REVIEWED ON APPEAL

At issue for decision in this appeal is whether:

- (1) Claims 16, 18-20, 23 and 24 are unpatentable under 35 U.S.C. 103 over JP 11-307791 in view of Yamagishi et al., Brandhorst, Jr., Spitzer, Mitsui, (of record) and the instant disclosure;
- (2) Claims 16, 18-20 and 22 are unpatentable under 35 U.S.C. 103 over Brandhorst, Jr. in view of Mimura et al., Mitsui and the instant disclosure; and
- (3) Claims 16, 18-20 and 22 are unpatentable under 35 U.S.C. 103 over Mimura in view of Brandhorst, Jr., Mitsui and the instant disclosure.

#### ARGUMENT

##### **The 35 U.S.C. § 103 Rejections Are Improper and Should Be Reversed**

- (1) **JP 11-307791 in view of Yamagishi et al., Brandhorst, Jr., Spitzer, Mitsui and the instant disclosure;**
- (2) **Brandhorst, Jr. in view of Mimura et al., Mitsui and the instant disclosure;**
- (3) **Mimura in view of Brandhorst, Jr., Mitsui and the instant disclosure are Improper**

The rejection of claims 16, 18-20, 23 and 24 as being unpatentable over JP 11-307791 (“JP ‘791”) in view of Yamagishi et al., Brandhorst, Jr., Spitzer, Mitsui, and the instant disclosure, of claims 16, 18-20 and 22 as being unpatentable over Brandhorst, Jr. in view of Mimura et al., Mitsui and the instant disclosure, of claims 16, 18-20 and 22 as being unpatentable over Mimura in view of Brandhorst, Jr., Mitsui and the instant disclosure, are respectfully traversed.

The final rejection acknowledges that none of the prior art references relied on discloses the claimed structure, but instead selectively picks and chooses various isolated and individual elements from various disparate prior art references in a hindsight attempt to recreate the claimed invention. Of particular note is the utter lack of any evidence for the final rejection's complete dismantling of the structure of the JP '791 reference and rebuilding of such structure in attempt to recreate the invention set forth in claim 16. See Final Rejection, pp. 7-8. While the Office action relies on various secondary references for their disclosure of minor features, there is absolutely no prior art evidence provided in the Office action for the wholesale rebuilding of the JP '791 structure to mimic the claimed invention.

None of the prior art references relied upon in the multiple grounds of rejection, and no combination thereof, discloses the structure as set forth in independent claim 16, as discussed above. The solar cell element of JP '791 as disclosed in Fig. 2 teaches a p-n junction 13-11 adjacent to the glass layer 3. Brandhorst Jr. discloses the prior art solar cell structure, having a metallic layer 14 at the rear surface. Yamagishi discloses a p-i-n structure 4 adjacent to a glass substrate 1. Spitzer discloses a solar cell with a p-n junction at a rear surface, with a reflector 42 mounted adjacent to the junction, and further fails to disclose any encapsulation of the solar cell element. Mimura et al. discloses a solar cell module having a glass substrate 105 and solar cells 104 encapsulated in a resin 103, with a backside covering member 102 made of TEDLAR film.

As explained above, JP '791 arranges the p-n junction interface on the light incidence side, in complete accordance with the common sense technical knowledge at the time of the JP '791 disclosure. As such, the position of the Office action that it would have been obvious to reverse or invert the structural composition of the JP '791 device is contrary to the common sense of those skilled in the art at the time and thus would not have been obvious, but instead is a clear hindsight attempt to reconstruct the claimed invention.

Brandhorst, Jr. teaches a cell wherein light enters from the side of substrate 10, and p+ layer disposed on a p-type substrate. However, even if Brandhorst, Jr. and Mitsui were to be combined with JP '791, the result would not disclose the limitation of

shielding a diffusion of sodium ions to the p-n junction as claimed in the present application.

Further, the use of the disclosure of the present application at page 5, line 19 – page 7, line 2 as prior art is improper. The relied-on passage of the application is an explanation of one of the premises of the invention, and is not a discussion of prior art or related art, and does not constitute an admission of prior art as alleged. Thus, the grounds of rejection are untenable to the extent that they improperly use the inventor's own teachings against him.

The Advisory action alleges that Appellants' arguments are directed to "the intended function" of the claimed structure. This is incorrect. Appellants have pointed out how the claimed structure is not found or suggested by any of the prior art references relied upon, properly considered as a whole for what they would reasonably suggest to one of ordinary skill in the art. The resultant improved performance and function of the claimed structure is a direct result of the structure claimed, and objectively demonstrates non-obviousness in that such structure was not recognized or implemented in the prior art, despite the significant improvements in performance obtained thereby. The Advisory action again resorts to improper picking-and-choosing of isolated elements among disparate prior art documents in attempt to show that "all claimed structural limitations" are "met" by the prior art. Such dissection of the prior art to excise individual elements which may correspond to individual claim limitations, is however an improper exercise when making a determination of obviousness under 35 U.S.C. 103. Instead, the prior art must be considered as a whole as to whether the prior art suggested the claimed invention as a whole to those of ordinary skill in the art. This the final rejection has failed to establish by any evidence, much less substantial evidence.

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**Conclusion**

In view of the foregoing, claims 16 and 18-20 and 22-24 are submitted to define patentable subject matter over the prior art of record, whether considered individually or in combination. The Honorable Board is requested to reverse all grounds of rejection as being improperly based and legally unfounded, and to direct passage of this application to allowance.

Respectfully submitted,

A handwritten signature in dark ink, reading "Vincent M DeLuca". The signature is written in a cursive, slightly slanted style.

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**CLAIMS APPENDIX**

16. A solar cell module comprising:  
a solar cell element;  
an incident light transmitting member made of a glass adhered at a light incidence side of the solar cell element by a resin; and  
a rear surface member comprising a transparent resin film adhered at a rear surface side of the solar cell element by a resin, wherein  
the solar cell element comprises a semiconductor junction so as to form an electric field and is sealed with each of the resin adhering the light incidence side light transmitting member and the rear surface member,  
the resin for adhering the incident light transmitting member at the light incidence side of the solar cell element contains a sodium ion depositing from the incident light transmitting member, and  
the solar cell element comprises a one conductive type crystalline semiconductor substrate between the semiconductor junction and the resin containing the sodium ion so as to shield a diffusion of sodium ion to the semiconductor junction; and  
an anti-reflection layer between the one conductive type semiconductor substrate and the resin containing the sodium ion, said anti-reflection layer comprising a silicon dioxide layer.
18. The solar cell module according to claim 16, wherein the semiconductor junction structure includes a single crystalline silicon substrate having a thickness so as to shield the diffusion of sodium ions from said resin into said semiconductor junction.
19. The solar cell module according to claim 16, further comprising: a one conductive type semiconductor substrate between the one conductive type crystalline semiconductor substrate and the resin containing the sodium ion.
20. The solar cell module according to claim 19, further comprising:  
a transparent electrode between the one conductive type semiconductor substrate and the resin containing the sodium ion.

22. The solar cell module according to claim 16, wherein the semiconductor junction is formed by a first conductive type crystalline semiconductor substrate and a second conductive type crystalline semiconductor substrate.

23. The solar cell module according to claim 16, wherein the semiconductor junction is formed by a first conductive type crystalline semiconductor substrate and a second conductive type amorphous semiconductor substrate.

24. The solar cell module according to claim 23, comprising:  
an intrinsic amorphous semiconductor between the first conductive type crystalline semiconductor substrate and the second conductive type amorphous semiconductor substrate.



EVIDENCE APPENDIX

None

RELATED APPEALS/INTERFERENCES APPENDIX

None